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AUTHOR Lapenta, Susan; Lutz, Todd
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ABSTRACT

Since 1984, Arizona's Mohave Community College (MCC) has implemented innovative educational technology to better serve students, including an instructional television system to serve remote locations and a distance learning program. In 1993, the college initiated a project to upgrade its technological capabilities through the establishment of a wide area network (WAN), the creation of local area networks (LANs) on each campus, the conection of all LANs to the college-wide WAN, and maintaining a college presence on the information superhighway. With the establishment of LANs on each campus, computer learning centers (CLCs) were built into each network, allowing for the consolidation of campuses' computer facilities into a single, easily accessed location. The WAN expansion included Internet access; connections to Northern Arizona University; electronic mail; network services to faculty, administration, and classrooms; and service to a remote facility. The expansion has required the creation of computer support and management positions to oversee the entire CLC structure. In addition, in summer 1995, MCC implemented Emerging Technologies (ET), a project designed to provide instruction to empower faculty and students and help them effectively utilize new technology. MCC has also developed a new department, the Network Information Center, which will handle such duties as providing county-wide Internet support to the college and other area public entities. (TGI)

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Processes and Planning Structure Required for Implementing a Collegewide Area Network

By

Susan Lapenta and Todd Lutz
Mohave Community College

Paper presented at the Annual Conference, the League for Innovation in the Community College (Phoenix, AZ, November 13-16, 1996).

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LEAGUE PRESENTATION

"Processes and Planning Structure Required for Implementing a Collegewide Area Network"

I. Location and brief history of MCC and Mohave County.

Established in 1971 Mohave Community College services the needs of the Mohave County, Arizona area.

Mohave county is located in the Northwest corner of Arizona and covers a geographical area of 13,285 square miles with a population of 100,000+. Mohave County is considered one of the fastest growing counties in the Country with a population increase of over 30% in the last 5 years. Mohave county is the 5th largest county in the contiguous United States and covers as much territory as New Jersey, New York, Rhode Island and Massachusetts combined.
Mohave Community College services this vast area with three Campuses and one Center located throughout the County.

Because of the great distances between its campuses. In 1984 MCC started one of the most unique, high-tech teaching methods in practice. The use of Interactive Television.

Presented by: Susan Lapenta, suslap@et.mohave.cc.az.us
Todd Lutz, tdl@et.mohave.cc.az.us

Through the Instructional Television System at MCC, students at all four campus locations are linked with other campuses so they may hear and speak with Instructors and other students who may be more than 100 miles away. This was accomplished by taking advantage of one of our natural resources, the high desert area. By installing microwave towers on various mountain peaks with line of sight points, signals travel from originating classrooms to each microwave receiver and is transmitted on "down the line", to our campus residing in the lower elevation areas. One of the most unique aspects of this setup was the challenge of spanning the Grand Canyon to obtain the linkup with our northern-most site, Colorado City.

With this development under our belt the College continued to grow and introduce new technology changes to better serve our students. In 1988 Mohave Community College introduced its Distant Learning Program which is our MCC implementation of Telecourses. The DL program offers students restricted by location, physical disabilities or home responsibilities the opportunity of educational improvement. Students interact with Instructors, via phone, videotapes, mail and person-to-person contacts.

Section II

In 1993 it became apparent that changes were required to provide our students with skills needed to succeed in the information age. Thus began the largest construction and technological improvement project in the history of Mohave Community College.

A 5 million dollar building project was initiated to provide for College expansion and improvement. Part of these funds were dedicated to upgrading our technological capabilities including:

- *Establishment of a College-Wide Network Backbone*
- *Creation of Local Area Networks on each Campus*
- *Connection of all LAN's to our college-wide WAN*
- *Providing Internet access and establishing Mohave Community College's presence on the Information Super Highway.*

Logically, the first goal to be addressed was establishing a workable backbone system.

Some of the challenges presented with this project were:

- *How to integrate existing cabling infrastructures*
- *What new cabling structures were needed*
- *How to obtain the goal of building a workable backbone with easy upgrade capabilities.*

Our existing infrastructure at this time consisted of transmitting phone (voice) and data (Appletalk and VAX connections) piggybacked on the existing ITS Direct Microwave Point-to-Point signal. Utilizing this method as a "back-bone" was quickly eliminated due to the bandwidth limits on the Microwave system.

The best method to provide our backbone needs was:

A series of dedicated digital 56k Phone Links between campuses. These were later upgraded to fractional T1's operating at 768 kbps.

LAN Establishment

With the backbone established, the next step was to establish Local Area Networks on each campus.

With funds available from the building project, temporary "mobile" buildings on each campus were replaced with

permanent structures. A dedicated Computer Learning Center was built in each location. Decisions were made to provide true data links to each campus for Network Computing as well as Inter-network Services.

CLC's (Computer Learning Centers)

Prior to creation of our Computer Leaning Centers our instructional computing needs were met independently on each campus. Computer facilities were scattered throughout a variety of buildings with no interconnectivity provided. Two of our campuses supported their instructional computing needs with the use of Lantastic to provide print sharing services, the other two met these needs by utilizing Novell server(s) to provide both print and file sharing services.

The implementation of the Computer Learning Centers on each campus allowed for the consolidation of all the scattered existing "computer labs" into a single, easily accessed location.

- *Open Lab Vs CIS/OIS Labs*

One of the unique things about our setup is the "ownership" aspect of the CLC buildings.

Physical layout of these buildings provide for a large central Open-lab area designed to provide computing resources to all students, staff and faculty. Surrounding the open lab area are 8 classrooms. Again, with this being a college-wide improvement program, District funds provided for populating each of the three CLC Open Lab area with all computer hardware, networking hardware, software and staffing required to support each campus Local Area Network. Each CLC supports an open lab configuration of:

- *Network Server, hubs, switches, concentrators and cabling*
- *Networked Laser printers*
- *30 Networked 486 or better PC's and Mac's*

The responsibility of the outlying classrooms was given to each campus. The majority of these rooms are used to support CIS/OIS classes.

Each of these classroom labs can support up to 24 workstations connected back to the main CLC servers. Each

campus is responsible for obtaining all hardware and software applications required in each classroom lab.

Networking Software to Use

With the approval and building plans underway for the new CLC's, network operating software was the next issue to be addressed. The network software used needed to network all the computers in the Open Lab area as well as those in the outlying classroom areas, as well as provide support for college-wide WAN connections. This area provided a bit confrontation on deciding the best NOS for our uses. There were many proponents of Lantastic as well as Novell. In the end, Novell Netware 4.x was chosen as the Network Operating System for its ability to support global network services as well as function as a true client-server rather than peer-to-peer system.

Our Computer Learning Centers have grown at a phenomenal rate. In our first semester in the CLC's in Fall of 1994, we supported an average of 250 student accounts, 70 workstations and approximately 24 applications, mainly supporting the CIS and OIS departments. As of this writing, we are now in the middle of our 5th semester in the CLC's. We are now averaging 1000 student

accounts per campus, close to 200 workstations each campus, as well as supporting up to 160 applications, including those for CIS/OIS, Science, Math, English, History, GED, Psychology, Nursing, etc.

WAN Setup

Each CLC was initially cabled to provide LAN access throughout the building; and then connected to the College-Wide backbone to provide WAN access. From there, additional connections were taken either from the main wiring areas in the Campus Student Center building or the Computer Learning Center and extended to reach other campus classrooms, faculty offices, and staff areas.

WAN expansion included the following:

- *Internet*
  - *Who*
  - *When*
  - *Where*
  - *How*
- *ASPIN Grant (Arizona State Public Information Network)*

In the Spring of 1994 Mohave Community College's connection to the Internet was supported through a NSF grant via the ASPIN project. The grant funded a 56k connection to NAU (Northern Arizona University), needed equipment such as routers, CS/DSU and installation. In addition the NIC established at NAU provided for technical support and training. Initial email service was provided on an existing VAX computer and MCC and later upgraded to a Unix Alpha server.

- *NAU connection*

  In addition to the services provided by the NIC (Network Information Center) at NAU. NAU also works in conjunction with MCC to support the NAUNet Instructional Television System operating statewide. NAUNet provides upper-level classes to the Kingman, Mohave Valley and Lake Havasu City areas. NAU students in these areas are provided access to NAU data systems through the CLC's on each campus. In return, NAU provides for our T1 access to the Internet via their microwave system.

- *Intranet*

  In the last 2 years we have expanded and upgraded our internal network to provide network services to faculty, administration office and the majority of our classrooms. This upgrade included substantial increased in cabling,

repeaters, hubs and interface adapters, routers, Alpha servers and fiber additions.

- *North Mohave Center*

  Many interesting challenges were faced with our northernmost facility in Colorado City due to location difficulties and lack of underlying network facilities. Colorado City, AZ is located on the northern edge of the Grand Canyon, requiring a 5 hour vehicle trip to reach, going through 3 different states (AZ, NV, UT, AZ). North Mohave Center was limited to dial-up access for the Internet. To help in overcoming the physical limitations of this area, MCC developed a grant proposal to NSF for providing network services in this area. The grant proposal entailed a high-speed T1 connection via our existing microwave link to the North Mohave Center. From our North Mohave Center we would then expand the link with wireless connection to 3 area k-12 schools and 1 public library in the Colorado City area. Additionally, an email/web server will be setup at MCC to provide services for these remote locations. This grant will be support by a Network Information Center established at the Mohave Community College's Kingman campus.

PEOPLE ISSUES

In 1992, prior to the inception of our technology upgrades. The need had already appeared for ongoing computer support at each campus. A new district position was created in each location, CINA (Communications and Instructional Network Assistant). The CINA's responsibilities were to support the existing CIS/OIS labs, as well as all computer systems on campus. Although the CINA position was a 40 hour/week position, classes were scheduled to run over a 14 hour period each day. After completing a normal 8 hour shift, each CINA was basically on call for any problems that might arise.

With the new CLC's going on-line, it soon became apparent additional staffing was required. Two (2) 29.5 hour part-time CCA (Computer Center Assistant) positions were added to Computer Learning Center staff. The CCA main duties are to support students in the open lab areas, maintain lab documentation and assist the CINA's on each campus when requested. With the amount of staffing hours available, CLC operation hours were set to 9:00 AM to 10:00 PM Monday through Thursday, and 9:00 AM to 2:00 PM Friday and Saturday.

As the semesters continued and workload increased, an additional 20hr per week Work Study position was approved for each CLC.

This allows us to have 1 CINA/ 1 CCA on duty from 8:00 - 4:00 and I CCA / I Workstudy on duty from 4:00 till 10:00 PM, always maintaining a dual coverage role.

In early 1995, it became apparent that an additional level of management was needed to oversee the entire CLC structure. The Instructional Networks Specialist position was created. The INS responsibilities include overseeing management and coordination of all CLC facilities, documentation, trouble shooting and support and research and development for future growth.
We are currently looking at such ideas as initiating an Intern program to provide student with practical hands-on networking and PC skills while earning college credit for their participation.

As the demand for technology aware personnel and our student base continues to grow we are once again addressing such issues as adequate staffing, remote personnel management, etc. Our initial management/organizational "structure" was appropriate for a project creation program, but is now reaching the stage of establishing long-term management structures and policies.

ET Program

In the summer of 1995, Mohave Community College implemented its newest program, ET or Emerging Technologies. The axiom of this program is:

Mohave Community College will be transformed to meet the educational and informational needs of the community in the 21st century by:

- *educating students who will command their knowledge so as to be competitive in the 21st century.*
- *Developing pedagogical methods based on contemporary learning theory.*
- *Creating and fostering an environment in which faculty are dynamic leaders in exemplary community college instruction.*
- *Constructing model human and technological service structures which support the transformation.*

In summation: ET is not a technology project. Some like to think that the computer networks and labs are ET. The fact is they are not. ET's mission, is to empower people, instructors and students, to transform the info superhighway into a knowledge superhighway. The ET program recognizes the fact that training with new technologies is often forgotten or issued a "not-priority" status. We at MCC believe that training on new technology is as important as the technological feats themselves.

With ET project underway additional staff was required. An ET faculty support person was hired to work directly with faculty being

trained in new instruction methods. Each semester 4-6 faculty members from each of the campuses participates for 2 terms in the ET program in exchange for 40% release time. Here, Instructor's are taught the best ways to use new multimedia and information access technology to enhance their individual instructional styles. After completing the training, each faculty can then function as an "on-site" consultant for other campus faculty members as they develop their innovative styles of instruction with technology.

With our involvement in the ASPIN grant program a new department was developed, Network Information Center. This department has been created and funded by a NSF/NIE grant. NIE, is short for the Network Infrastructure for Education. The department and the related position is currently in the process of being filled. This position functions as a full-time MCC grant funded opportunity. This department will handle such duties as providing county-wide Internet support to MCC and other Mohave County public entities. It will provide coordination to complete the Internet access project to the Colorado City area public schools and library facilities. This department will also coordinate additional grants to complete networking of remaining county public entities. Additional responsibilities would include creation of a "Help-Desk" support medium, as well providing support for Internet content development in conjunction with NIE.

Conclusion

From servicing the needs of an individual student to providing information access to an entire rural county, Mohave Community College continues to be leader in the innovation of technology.

As we celebrate our 25th Anniversary, we look forward to maintaining our high standards of Academic excellence and cutting edge technological innovations.

Mohave Community College – Your Partner for Success

Presented by: Susan Lapenta, suslap@et.mohave.cc.az.us
Todd Lutz, tdl@et.mohave.cc.az.us

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Sign here→ please	**Signature:** Susan M Lapenta	**Printed Name/Position/Title:** Susan M. Lapenta, Instructional Networks Specialist	
	Organization/Address: Mohave Community College, 1971 Jagerson Avenue, Kingman, AZ 86401	**Telephone:** 520-757-0891	**FAX:** 520-757-0859
		E-Mail Address: suslap@et.mohave.cc.az.us	**Date:** 12/12/96

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